International Harmonized Research Activities - Intelligent Transport Systems
Working Group Meeting
April 12-13, 2000, Lyon, France

Minutes

Attendees:

Dr. Ian Noy (Chairman, Transport Canada, Canada)
Mr. Christopher Patten (National Road Administration, Sweden)
Dr. August Burgett (NHTSA, U.S.)
Dr. med. B. Friedel (BASt, Germany)
Dr. Annie Pauzié (INRETS, France)
Mr. Kaneo Hiramatsu, (JARI, Japan)
Mr. Daniel Augello (Renault, France)
Marie-Claire de Franchien (French MOT)
Chris Parkin (DETR, UK)
Kenji Nijya JAMA representative, Japan

1. Introductions

- I. Noy welcomed members and thanked A. Pauzié for hosting the WG meeting.
- An introduction video was presented on the research conducted at INRETS
- I. Noy informed the group that the IHRA Steering Committee is planning to review the IHRA program goals and achievements before ESV 2001. They will be asking each of the working group for self evaluation reports

2. Approval of Minutes

- Minutes of the previous meeting were approved. Most action items are complete or in-progress.

3. Report on Stockholm Workshop

C. Patten presented a report on the workshop held last year in Stockholm (see Annex 1). As a result of the workshop, SNRA expects to use the revised UK checklist in their SafeTE program. There may be further opportunities for interested WG members to collaborate in this program.

4. Update on EU

I. Noy reported on meeting with DG7 and DG13 (involving K. Hiramatsu and A. Burgett) during the ITS World Congress in Toronto, November 1999 (see Annex 2). There has been some follow-up, especially with DG7. DG13 seems to be moving away from road traffic and toward sensors and other transportation modes while DG7 is becoming more interested in areas relevant to this group.

DG13 suggested holding regional meetings in Europe to discuss IHRA involvement in EU work projects. The WG did not consider this to be workable.

A. Pauzié reported on EU reorganization (see Annex 3). The DGs involved in in-vehicle systems/ITS are DG13 (Information Society), DG7 (Transport), and DG3 (Enterprise). There is increasing awareness that this needs to be addressed at European level.

DG3 is represented by Mr. Per-Ove Engelbrecht (Sweden) on the IHRA Steering Committee. Action - I. Noy will follow-up with DG3 et al. To introduce the IHRA-ITS and explore the possible role of IHRA in DG3 programs.

B. Friedel raised the question of how IHRA could participate in funding. I. Noy responded that European members can participate in a project consortium and receive EU funding, and non-European countries would have to provide their own funding. Associate states, such as Canada & U.S., are allowed to participate in European projects in this manner. Thus, an IHRA proposal might fit with this type of funding, but mechanism for doing this is not clear. One difficulty is that not all IHRA countries have Associate states with EU. B. Friedel noted that partnering is a complex process which involves confidentiality agreements. Another possibility would be for European IHRA members to take the lead, including trying to form IHRA consortium.

D. Augello noted that IHRA activities will not lead to a product so there will be little interest by European manufacturers for standards development, though the need for it is recognized by EC.

D. Augello also mentioned that ERTICO has prepared background notes in preparation for France assuming the presidency of the Commission (see Annex 4) - France is also reorganizing national program to put emphasis of road safety (see Annex 5).

C. Patten noted Commission policy on HMI (see pp10) that Commission may push for type approval. It is not clear how individual countries will react to this. The Commission also promulgated its recommendations on 12/21/99 regarding the Statement of Principles for HMI, requesting manufacturers to respond within two years indicating how the principles have influenced product development (see Annex 6). Perhaps IHRA-ITS can play a role since safety evaluation will be an important element of industry response. IHRA-ITS members may wish to propose a unified approach. I. Noy invited European members to discuss how they will respond to EC recommendation. B. Friedel suggested

that I. Noy write a letter in response to EC recommendation to outline the WG's interests and possible role.

K. Hiramatsu inquired whether the Statement of Principles relates to ESV, which is primarily concerned with harmonized research. WP29 is the appropriate body to consider regulations. I. Noy responded that there are research needs that flow from the Statement of Principles, and that the WG's research is expected to lead to standards. B. Friedel suggested that I. Noy send a letter to the Chair of WP29 to establish stronger links, referencing the EC recommendations. D. Augello will ask ERTICO about their interest in coordinating a unified industry approach to EC recommendations.

5. Project Reports

5.1 Project 1: Development Of A Harmonized Safety Evaluation Methodology Framework (Worldwide) *LEAD: Augello, Pauzié*

A. Pauzié distributed a report summarizing techniques and metrics that have been employed for road safety evaluation of in-vehicle systems based on a review of scientific papers emanating from European projects such as HARDIE, CORD, and HOPES (see Annex 7). The techniques have been rated on relevancy concerning evaluation of safety for in-vehicle system. The report needs to be reviewed by researchers and experts and elaborated in terms of driver/driving conditions and should. A. Pauzié mentioned that INRETS has a project that is measuring workload of a variety of driving situations. She notes that this is mid-to-long term research.

B. Friedel noted that new sensors are making it possible to have more intelligent test conditions and questioned whether it is possible to incorporate a reasonable number of conditions. A. Burgett noted the inclusion of many test conditions in research and product development of IT systems. I. Noy noted that current crashworthiness standards use simplified test conditions for certification - Can ITS standards do the same?

C. Patten noted the peripheral detection task (PDT) used in Sweden is a good workload test and should be included in the framework - it is being used by Volvo.

A. Pauzié will ask for comments from all Project 1 interested parties. She will also ask for comments on what additional data are needed for reaching consensus on criteria. In particular, respondents will be asked :

- To check if the list of techniques and metrics is complete and valid.
- To discuss and to state upon the scoring of each technique according to the IHRA WG purpose
- To discuss the principle of defining safety critical values for some parameters such as glance duration toward the system, time of use,.: is it possible to find a general consensus on this aspect ?

- To identify the areas where more research is required.

Information about types of critical environments relevant to run testing will be added, based upon research underway at NHTSA on this topic. The next step will be to agree upon the metrics to use for the identified techniques. In this framework, information from Task 6 (evaluation of workload by secondary task) and Task 7 (harmonisation and validation of surrogate safety measures) will be included as inputs.

5.2 Project 2: Driver Understanding And Expectation Of ITS Systems: Identification And Measurement Of The Effects Of False Expectation Of Driver Performance, *LEAD: I. Noy*

I. Noy distributed the minutes of Project 2 meeting of 4/10/00 (see Annex 8). The sub-group discussed various forms of collaboration, including joint projects, information exchange, personnel exchange, etc. Although there are a variety of projects underway, joint research is difficult to organize, although a number of bilateral collaborations were discussed (e.g., TC participation in RESPONSE user tests). For the most part, however, current projects have been planned and are not open to new participants.

5.3 Project 3: Human Factors Principles Checklist For In-Vehicle Systems, *LEAD: B. Friedel & C. Patten*

Questionnaire returns were poor - 4 responses out of 15. General conclusion : It would appear that there are few opportunities for cooperation in this area, mostly due to the fact that IHRA has no money to sponsor research.

C. Patten noted the collaboration that led to the success of the Stockholm workshop.

5.4 Project 4: Normative Data On Naturalistic Driving Behavior, *LEAD: A. Burgett*

Only 2 responses were received to the questionnaire. While there is high interest in this area the opportunities for cooperation are few. This is partly due to the magnitude of the studies which would fall in this category. It was noted that the Swedish ISA project is collecting naturalistic data.

5.5 Project 5: Simulator Reference Test Scenarios, *LEAD: C. Patten*

C. Patten presented a progress report (see Annex 9).

Although there are European projects such as RESPONSE and HASTE that are relevant to this project, no opportunities for cooperative work resulted from letter. One problem is the confidentiality of pending projects.

The difficulty with trying to find common reference scenarios is that currently-used scenarios are developed for specific projects with specific questions. Another approach would be to start with specific crash problems to develop reference scenarios. It would also be helpful to have a compilation of questions that can benefit from simulator work and those that cannot.

K. Nijya offered to write a report documenting Japanese use of simulator test scenarios, which could be used as a template for soliciting information from other countries. This information could then be the basis of an expert workshop in this area. C. Patten to work with K. Nijya to develop the format for the report summarizing use of simulators and scenarios.

- **Reference 'tiles' in simulator scenarios.**

- Suggestion to create a separate project that concentrates solely on simulator reference test scenarios.

- Suggestion that a workshop should be organized to assess needs and requirements for the simulator users, i.e., manufacturers and research institutes.

    - Japan to draw up a template for member countries to complete from previous Japanese experiences in this area.

    - This would act as a precursor for a workshop.

    - Surrogate measures and their scenario requirements should be featured.

5.6 Project 6: Improved Secondary Task Methodology For Evaluating Safety Effects Of Driver Workload, *LEAD: K. Hiramatsu*

K. Hiramatsu presented a progress report, including a conceptualization of the workload problem (see Annex 10). There are two principal methods to measure workload: direct and indirect. In the direct method, workload is inferred from degradation in performance of the driving task. Each system must be treated separately under a variety of driving conditions. The indirect method involves introducing a secondary task

However, where we go from here is not clear.

5.7 Project 7: Harmonization And Validation Of Surrogate Safety Measures, *LEAD: A. Burgett*

There has been only 1 response to the letter of solicitation. This topic is problem specific; and countermeasure specific.

The prospect for collaborative research is not high, but this remains an important area that will be a key concept for future work.

6. National Research

6.1 Japan

K. Hiramatsu presented a list of relevant papers prepared by JAMA (see Annex 11).

ITS in Japan falls under several jurisdictions: e.g., MOT has the ASV program; MOC has the AHS program; MITI is responsible for standards, etc. Reorganization of ITS is being considered in which the five ministries will combined, MOT, MOC, ISO standards MITI, Public, Telecommunications. Public agencies are increasing their role.

Budget planned for future research in areas relevant to IHRA-ITS, but not guaranteed. There is a need for basic research and standards in DVI and integration. Would like to contribute to driver adaptation and workload.

A joint demo of SMARTCRUISE is planned for December in Tsukuba.

In answer to a question about cell phone use, K. Hiramatsu mentioned that Japan does not allow hand held cell phone use.

6.2 France

Program of 4 years managed by the National Centre of Scientific Research (CNRS) which aim at gathering laboratories from Universities and Research Institutes in France on the topic "Co-operation between driver and system". This program began 1 year ago : in this phase, participants set up working groups. The final objective is to develop prototype systems relevant to assisting drivers.

Programs PREDIT funded by Ministry of Transport and Ministry of Research on specific projects that are identified as priority. These projects included industrial and research, and aimed at defining concrete propositions or systems in 2 or 3 years. Examples of projects : automatic detection of incidents in tunnel with in-vehicle information to the drivers; impact of phone use on the driver activity.

6.3 U.S.

A. Burgett mentioned that there is increasing interest in the U.S. in driver distraction and workload. He presented an approach to dealing with the safety evaluation of "safety-related" systems (i.e., systems specifically designed to improve safety, see Annex 12).

A number of activities are planned on driver distraction for the Summer, 2000. There will be an invitation to IHRA-ITS WG members to attend a public meeting in Washington (see Annex 13). The dates have not been finalized. NHTSA web site has additional information.

The National Intelligent Vehicle Initiative (IVI) meeting is scheduled for July 19-20, 2000 in Washington (see Annex 14).

A. Burgett also presented an excerpt from the U.S. Intelligent Cruise Control Field Operational Test (see Annex 15).

A press release announcing GM's plan to introduce Internet-based Infotainment services in the Cadillac by the end of the calendar year (see Annex 16).

6.4 Sweden

SafeTE project: Project description in brief (Year 2000):

New technologies, e.g. navigation systems, visual enhancement systems, onboard Internet connections etc., are going to increase in popularity and numbers in the not-so-far-away future vehicle. Indeed, some vehicles are already supplied with such systems factory-mounted and functioning. A collective name for these integrated and autonomous systems is the term 'Intelligent Transport Systems' (ITS). This new technology will probably aid the driver (and passengers) but their introduction may also create new problems. All of this new technology is not necessarily suitable or appropriate for use in moving vehicles in today's traffic. The Swedish National Road Administration (Vägverket) has subsequently initiated a project, SafeTE, to assess the interaction or interface between the new systems and the drivers. The initial focus will be on in-vehicle driver information and support systems, and the assessment perspective is traffic safety. This project should be seen as a pilot study where the foundation of more long-term testing can be laid. To achieve this, we need to develop tools, methodology and test scenarios. Such work is being done internationally, such as in the UK at the Transport Research Laboratories (TRL), where TRL has recently developed an assessment tool. TRL and other research establishments' work will form a foundation for our evaluation programme. The SafeTE project will use expert judgment as a method of evaluation and assessments as well as applying an objective measure i.e., peripheral detection task (PDT) as a test of mental workload. Naturalistic test scenarios will be defined and used in the evaluation framework. Navigation systems will be first on to the test bench. By testing and evaluating technical systems and giving them a relative rating from a traffic safety perspective, as well as providing written assessments, it is intended that we can inform industry and the general public about these systems. Above all, we hope to gather data that identifies potentially unsuitable or even hazardous in-vehicle driver support systems.

The Intelligent Speed Adaptation (ISA) project in Sweden is a large-scale trial being conducted in four Swedish cities. Several thousand cars are being equipped with intelligent technology to help drivers keep the correct speed. There are different evaluation areas, technical, traffic effects & human behaviour. The human factors section are conducting user acceptance studies, conflict-studies, interaction/ behaviour studies (with scientist as a passenger), user's traffic-safety attitude studies and simulator validation studies. Most of the above mention studies have done baseline pre-studies, with repetitions due throughout the course of three years of trials.

EC recommendations on HMI:

The European Commission (EC) recommendation of 21 December 1999 on safe and efficient in-vehicle information and communication systems: A European statement of principles on human machine interface (HMI) is being addressed. Sweden would, moreover, like to co-operate with other countries. Initial contacts are being established. The Swedish work group is moving towards a national MOU (memorandum of understanding) with the Swedish vehicle industry.

6.5 Canada

Most ITS safety research at TC is done in-house, but some is subcontracted out to universities and research firms.

A number of projects are planned, including:

6.5.1 Driver visual scanning while using a hands-free cellular telephone.

This is part of a multi-year research program designed to explore theoretical issues associated with driver visual performance as it may be influenced by a variety of ITS devices, and their implication for traffic safety. The research will consider a variety of ITS applications. In the present study, changes in drivers' visual scanning patterns associated with the use of cellular telephones will be investigated. The study will involve the use of SWIRV and eye tracking system, Vision 2000.

6.5.2 Literature review of the literature on behavioural adaptation

A literature review will be performed to summarize the current state-of-knowledge concerning behavioural adaptation. In particular, the review will attempt to identify the mechanisms underlying behavioural adaptation to on-board ITS systems and the factors that affect the degree of adaptation. The review will attempt to develop a theoretical framework for this response. The ultimate objective is a model which can be used to predict the effects of behavioural adaptation on safety.

6.5.3 Behavioural adaptation to lane departure warning system

A series of studies will be conducted to explore potentially important factors underlying behavioural adaptation as a predictable human response to changes in technology. The studies will be conducted using the STISIM simulator to identify specific factors, such as feedback latency, safety consequences, driver trust and information reliability, that may be potentially important to include in the model. In addition, on-road studies using SWIRV are planned to investigate behavioural adaptation to lane departure warning systems, as a specific ITS application.

6.5.4 Organize TRB session on situation awareness in driving

Our research has shown that situation awareness (SA) is a potentially useful surrogate for safety. However, to date SA metrics have not been developed or used in road safety research. There is a relatively small number of researchers actively working in this emerging area of research. The purpose of this TRB session is to provide a forum for the scientific exchange of theories and data related to SA in driving.

6.5.5 Analysis of Human Factors Issues arising from current TICS standards development

On-going participation in committees that establish international standards related to the human-machine interface and human factors and safety of ITS is an important part of our work. The relevant committees include ISO/TC22/WG8, ISO/TC204/WG14 and SAE Safety and Human Factors. Our purpose in participating is to contribute towards the development of sound industry standards. Good industry standards are relatively easy to incorporate in vehicle safety regulation. Participation also provides valuable insight into the capabilities and limitations of new technologies, insight that could lead to specific research and possible regulation.

6.5.6 The effect of Auto-PC on drivers' visual attention and workload.

A number of devices have been introduced which provide drivers access to a wide variety of infotainment functions, including mobile office and access to the Internet. OEM's have recently announced plans to offer these technologies as optional equipment within the next year or two. A number of safety issues arise which relate to Internet access by drivers, including distraction, interference, transaction complexity, cognitive lock-up, etc. Discussions with NHTSA suggest a strong interest in collaborative research in this area. If it materializes, the study will be conducted at VRTC and driver eye movements will be recorded and analyzed using the Vision 2000 eye-tracker system.

6.5.7 Minimum safe headway for adaptive cruise control.

Highway geometric designs assume a driver perception-reaction time of 1.5 seconds. However, manufacturers will be introducing adaptive cruise controls that can be set to time gaps as low as 1.0 s. This study will investigate the safety considerations associated with headway settings between 1-1.5 seconds under different conditions of driving and for different individuals. The principal question is whether the minimum headway should be regulated, and, if so, at what level?

6.5.8 Driver expectation

The goal of this project is to determine how well drivers understand ITS systems and the performance expectations they have for these systems. A second goal is to assess the safety consequences of mismatches between driver expectation and system performance. Drivers have many different ITS applications available to them. They can equip their cars with ACC, navigation systems, and communication systems, among other things. Each system is designed to aid the driver in a different way and each has different operating characteristics. The picture is further complicated by the fact that for a particular type of ITS, such as ACC, system performance characteristics may vary from one vehicle/system to another. How well the driver understands the ITS application and the expectation he or she has for its performance can directly impact the safety of its use. The focus of the current project is an assessment of how well drivers understand what particular ITS applications can do.

6.6 U.K.

The UK Department of the Environment Transport & the Regions has been involved in 4 recent and on-going ITS projects (see Annex 17). ICE Ergonomics were commissioned to develop guidelines on the design of in-vehicle information systems, these were subsequently published by the British Standards Institute as a Draft for Development. They then fed into work conducted by TRL in developing their evaluation checklist. University of Leeds and MIRA have jointly conducted a project on External Vehicle Speed Control/Intelligent Speed Adaptation including simulator and on-road trials of a system which controlled the vehicles speed mandatorily and one which could be deselected by the driver (see Annex 18). The accident reduction predicted for widespread implementation of a mandatory system was up to 36%. Simulator trials showed a reduction in headway and gap size accepted when turning into or across traffic when using the system. On-road trials showed no evidence of worsening driver behaviour with use of the systems. A variety of Road User Charging systems will be assessed over the next 3 years in a project involving road trials with over 1000 vehicles. This will consider performance requirements, infrastructure and interoperability of systems. In addition to these projects, which are all funded by DETR, the department is an advisory partner in the FRETSET project. This is looking at the application of integrated telematics systems to trucks and buses. Road trials of a demonstrator vehicle with navigation aids and collision avoidance systems will start in one month's time.

6.7 Germany

B. Friedel reported on workshop on intelligent speed management. Germany not in favor (for legal reasons) of external speed control

BAST is involved in proposals for 5th framework

In addition, a number of projects on safety were submitted to German MOT for funding, including investigation of misuse, evaluation of ACC and behavioural adaptation. Interest in behavioural adaptation may lead to collaborative opportunities with Transport Canada.

7. Next Meeting

Oct. 3-4, 2000 - Ottawa (if NADS available may be changed to Iowa)

Main item on the agenda would be preparation of report for presentation at ESV

8. Concluding discussion

K. Nijya observed that IHRA-ITS is, in theory, the link between research and regulation. He suggested that the key role should be 1) strategic planning for future regulation, 2) basic study of research. In this regard, the WG should create a database of HMI research. This activity has, in fact, already been started and needs to be updated. It was also suggested that WP29 should be asked to identify its priorities in the ITS area.

Another idea is to select an element of EC statement of principles as focus for work. EC statement might form the basis of our future work.

Another idea would be to consider research needs for creating a process-oriented standard equivalent to ISO 9000. The prospect for regulating ITS is doubtful in view of the accelerated development of intelligent technologies and increasing diversification of products. One possible outcome would be a type approval system for ITS products/manufacturers. It was noted that this approach is compatible with EC recommendations.

K. Hiramatsu notes that JMOT would like to see IHRA go beyond information exchange.

After some discussion about whether to restructure or combine certain of the priority projects, it was decided to keep them as they stand for the time being.

A. Burgett presented the following schematic, showing project framework, for consideration by the WG.

9. Action Items

9.1 Update on EU

I. Noy will follow-up with DG3 et al on the possible role of IHRA in DG3 program

I. Noy to write a letter to the Chair of WP29 to establish stronger links, referencing the EC recommendations and asking WP29 to identify its priorities in the ITS area

D. Augello to ask ERTICO about their interest in coordinating a unified industry approach to EC recommendations.

9.2 Project 1

I. Noy to send A. Pauzié list of Washington Workshop participants

A. Pauzié to send summary report to researchers to obtain feedback and additional information concerning driving situations and driver conditions

9.3 Project 2

I. Noy to explore collaboration with Volvo on EU RESPONSE project WP on user expectations.

9.4 Project 3

C. Patten, SafeTE, to explore collaboration with Germany.

9.5 Project 4

No immediate opportunities for collaboration

9.6 Project 5

K. Nijya and K. Hiramatsu to prepare state-of-the-art report on Japanese simulation research in cooperation with C. Patten, focusing on value of simulation, what can be done, what can't, etc.

C. Patten to develop template based on Japanese report and solicit reports from other countries.

C. Patten to plan for workshop targeted for ESV

9.7 Project 6

K. Hiramatsu to organize a meeting on secondary task methodology.

K. Hiramatsu to send out slides and questionnaire

9.8 Project 7

A. Burgett to write a short description of surrogate measures (2 pages or so) and recommend whether this should be combines with Project 1.